

## Efficiency of CreaCell`s hERG clone on Nanion's Port-a-Patch® and Patchliner®

The electrophysiology team at Nanion Technologies GmbH, Munich. Cells were kindly provided by CreaCell, France.

### Summary

The hERG gene (KCNH2) encodes a potassium ion channel (Kv11.1) responsible for the repolarizing  $I_{Kr}$  current in the cardiac action potential (Sanguinetti *et al.*, 1995).

Abnormalities in this channel may lead to either Long QT syndrome (LQT2) (with loss-of-function mutations) or Short QT syndrome (with gain-of-function mutations), both potentially fatal cardiac arrhythmia, due to repolarization disturbances of the cardiac action potential.

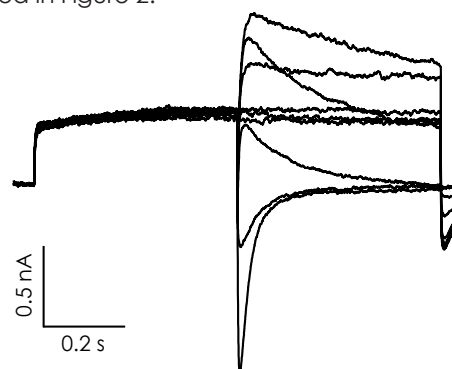
Given the importance of this channel in maintaining cardiac function, it has become an important target in compound safety screening.

Prerequisite for a reliable pharmacological screening is a cell line stably expressing Kv11.1 mediating a sufficiently large current.

Here, we demonstrate the efficiency of hERG stably expressed in HEK293 cells, supplied by CreaCell. The presented data were collected on Nanion`s Port-a-Patch and Patchliner.

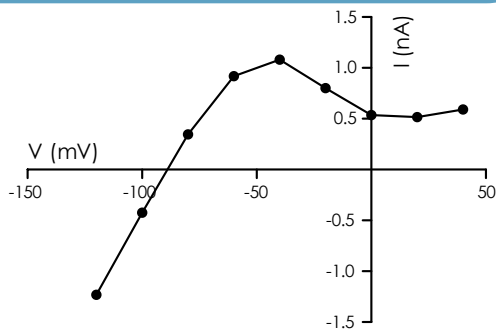
### Results

For electrophysiological characterisation, we used a voltage step protocol from the holding potential (-80 mV) for 500 ms to +40 mV followed by a 500 ms step to voltages ranging from -120 mV to +40 mV (20 mV steps), before stepping back to holding potential. The current obtained showed the kinetics typical for hERG channel as shown in Figure 1. The corresponding current-voltage relationship is depicted in Figure 2.



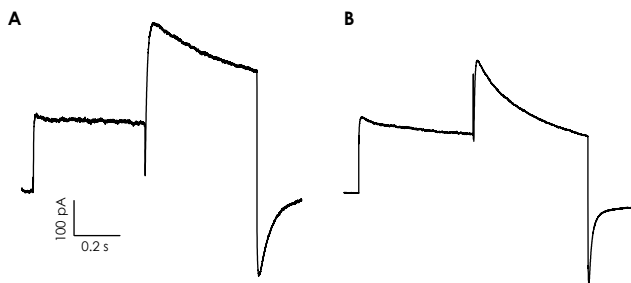
**Figure 1:** Example traces of typical hERG whole cell currents as recorded in HEK293 cells. The data were collected with the Port-a-Patch. Currents were elicited by a voltage step protocol as described elsewhere.

# Application Note



**Figure 2:** Current-voltage plot of the peak amplitude from the example trace in Figure 1.

The current responses recorded with the Port-a-Patch were comparable to that recorded with the Patchliner (Figure 3).



**Figure 3:** Typical hERG whole cell currents as recorded in HEK293 cells elicited by stepping from a holding potential of -100 mV to +40 mV for 500 ms, followed by a step to -40 mV for 500 ms and back to the holding potential. **A**, recordings from the Port-a-Patch. **B**, example trace of an individual cell recorded on the Patchliner.

## Reference

1. Sanguinetti, M. C., Jiang, C., Curran, M. E., Keating, M. T., 1995. A mechanistic link between an inherited and an acquired arrhythmia: HERG encodes the IKr potassium channel. *Cell*. 81: 299-3072.

## Methods

### Cells

HEK293 cells stably expressing hERG (kindly provided by CreaCell) were used.

### Cell culture

Cells were cultured and harvested according to Nanion's standard cell culture protocol.

Performance	Port-a-Patch N = 22	Patchliner N = 8
Sealing rate	100 %	83 %
Mean peak current amplitude	511.4 ± 34.2 pA	373 ± 67 pA

**Tabelle 1:**

The different hERG clones expressing HEK cells showed different performances on both, the Port-a-Patch and the Patchliner. The data are presented as mean ± SEM.

In conclusion, we have demonstrated stable recordings of the hERG channel on a planar patch clamp system. In general, recordings from HEK cells overexpressing the hERG revealed a good performance on the Patchliner, but a better performance on the Port-a-Patch (Tabelle 1). The average peak current density of hERG expressing HEK cells was  $64.5 \pm 8.4$  pA/pF.

## Electrophysiology

Whole cell patch clamp recordings were conducted according to Nanion's standard procedure. Currents were elicited using a voltage step protocol from a holding potential of -100 mV to +40 mV for 500 ms followed by a step to -40 mV for 500 ms and back to the holding potential. The step was repeated every 20 s. For the quantification of the cell stability, the current amplitude had to be stable for at least 2 minutes. Data are presented as mean ± SEM.